

SNOW



The 1917 600-HP Snow gas compressing engine, all polished and oiled, waiting for its debut at the 2013 Coolspring Power Museum Summer Exposition.

It took 20 years, but this 1917 600 HP Snow gas compressing engine finally calls Coolspring Power Museum home

By Paul Harvey,
founder of the
Coolspring Power Museum

More than 45 years ago, I stumbled upon Roystone Station, which was located on US Route 6 between Sheffield and Ludlow, Pennsylvania. I was a young engine collector then, just beginning to explore the vast oil fields in northern Pennsylvania to search for old engines. Seeing the magnificent brick and steel structure, I was lured to stop for a visit and there I found many great gas engines in operation, including the Snow engine now displayed at the Coolspring Power Museum.

Roystone was the main station of the Pennsylvania Natural Gas Co. based in Warren, Pennsylvania, which is now part of the National Fuel Gas Corp.

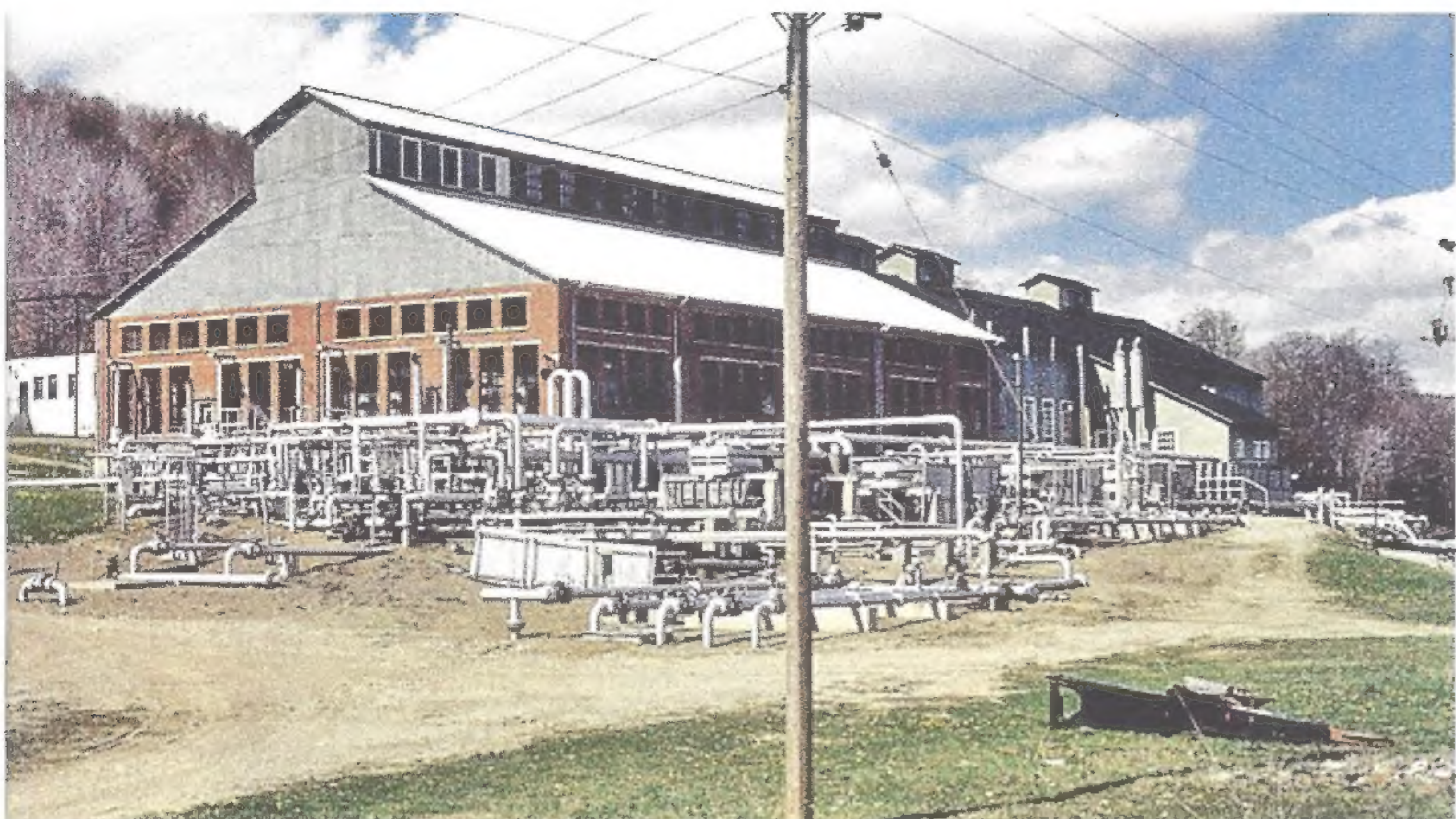
The old station is now gone and a modern one has been built. Presently it serves as a storage field in which the gas is pumped into the ground from western suppliers in the summer to be recovered and used in the winter. It originally pumped from the local fields, and this gas was then sent to the Buffalo and Rochester, New York, markets to be distributed for home and industrial use.

In the mid 1970s, and with no definite plans besides the desire to save one of the big Snows, I started a lasting relationship with the plant engineers and local administration, and was happy to find them receptive to the idea. Finally, in late 1992, I was invited

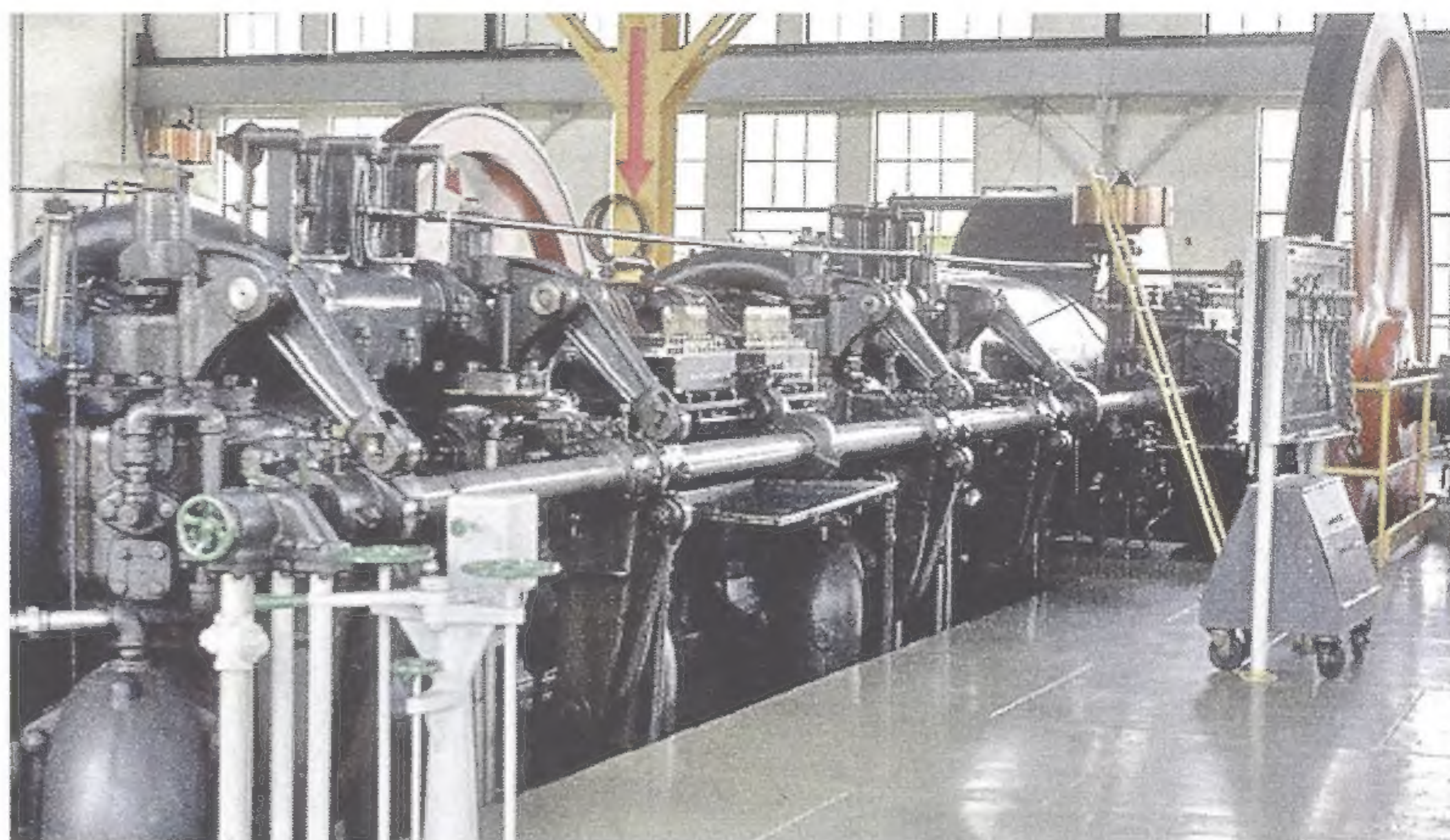
to come to Roystone to witness the last working day of our Snow. Shortly thereafter, I met to sign the documents on behalf of the museum to make the Snow ours. We now had the winter to remove it: to disassemble and transport a 140-ton machine and place it in safe storage until it could be assembled again. This would turn out to be a 20-year project.

Disassembly

The volunteers from the museum took the task seriously. Six or eight of us would trek to Roystone over many weekends. The first step was disassembling the engine. The compressor cylinder was removed and trans-



Above: Roystone Station in 1963, which remained much unchanged until 1993.



Above: Coolspring's Snow engine at work in 1963.

ferred to the front crane and traveled to load onto our truck. This was a tedious and labor-intensive project that frequently required six people to pull the hand chain to lift the heavy parts since the hoists were entirely manual.

The next task was to remove the flywheel from the crankshaft. The wheel weighed 18 tons and split into two halves. It was held together at the hub by four huge bolts, 4 inches in diameter, and at the rim by four cast iron keys or "dogbones." Removing the flywheel proved to be a challenge. We heated the keys red hot for expansion and then pulled them out with a manual chain puller. Each dogbone weighed about 150 pounds and had to be supported with the

overhead crane. We then found that they were a bit different in length so they were carefully marked for reassembly.

The main frame for the engine was a huge project. We jacked the engine out of the foundation and placed it on rollers to get it out of the building. The crankcase bottom extended 1 foot below the base. This, in addition to 10 feet of unsupported floor between the engine foundation and building footer, required a huge amount of timber blocking to get out of the low, narrow doorway.

Smith Hauling of neighboring Oliveburg, Pennsylvania, provided the necessary crane and truck to move the main frame. With the huge casting just outside the station, the Smith

crane was able to lift it and place it onto their trailer. This was April 4, 1993. They chose their big Autocar tractor, "old number one," to pull the load.

National Fuel Gas Corp. kindly allowed us to use their vacant Knox Station, about 5 miles from Coolspring, to store the Snow parts. They realized that it would be many years before they came together again. However, some of the large parts had to be stored outside at the museum.

Laying the groundwork

After 10 years of much planning and funding work, in June 2005 we began clearing the area where the Snow would be housed. Brush was removed and a stable shale fill was installed.



Above left: Our engine (to the right) with some parts already laid out on the floor. Note that the compressor cylinder has been removed and is hanging on the manual chain-fall crane to the left rear. It was then transferred to the front crane and traveled to load onto our truck.

Above right: Heating the "dogbone" keys red hot for expansion and then pulling them out with a manual chain puller.

Right top: A flywheel half, weighing 9 tons, loaded onto Paul's dependable old "tilt-bed," a 1976 International 2070A Fleetstar with a 290 HP Cummins engine and 9-speed Roadranger transmission. Note the size of the doorway that the entire engine had to come through. Everything came home on this truck except the 34-ton main frame.

Right bottom: The main frame jacked out of the foundation, awaiting rollers to take it out of the building.





Above left: With the huge casting just outside the station, the Smith crane was able to lift it and place it onto their trailer. Above center: Unloading the main frame to the place where it would spend many years. Above right: The compressor cylinder ready to be unloaded into Knox Station. Again, a small doorway and unsupported floor were encountered, which required using a 10-ton manual chain hoist to position the parts. Interestingly, this structure originally housed two massive National Transit gas engines, and their foundations provided stable support for our storage purposes.

After all the leveling and filling, we dug a big hole to accommodate the huge concrete foundation. When the engine was removed from Roystone, our volunteers spent several days measuring the old foundation to produce a computer-generated foundation plan for re-erection. We trusted that it would be accurate and all the mounting bolts would line up. Finally completed in October 2005, the foundation required 287 yards of concrete, which was done in two pours. The first was a massive flat base pad 3 feet thick, and the second was the foundation itself. A con-

crete pumping truck worked an entire day to fill the frames. After several weeks, we removed the framing. Then we had to wait, as it would require many months for the concrete to cure so that the parts could be placed upon it.

Heavy lifting

In May of 2006, the big test came. With the aid of Smith Hauling again, the main frame was set. They loaded it from where it rested for many years onto one of their trailers and carried it to the foundation where they placed it with their crane. They had already placed the bot-

tom flywheel half onto blocking in the pit. The main frame fit the many bolts ... well, almost. One shifted during the concrete pour and had to be adjusted, but then it was in place. Now the big job of leveling a 34-ton casting and placing the grouting began. Also, grating needed to be cut and fit to cover the pits needed for future piping and accessories, and to make a safe work place. All further assembly was then done with the museum's Lorain crane and ex-military crane truck.

Then it was time to retrieve all the parts that had been stored in Knox Station so many years



Left top: Removing the framing of the foundation. Left bottom: The big test: With the aid of Smith Hauling again, setting the main frame. Above: A satisfied crew with the 10-ton compressor loaded onto the old "tilt-bed" truck for the short trip back to Coolspring.



Above: The cylinder base plate and rear crosshead casting in place, and the rear power cylinder being lowered into place by the Lorain crane. Right: The Lorain lowering the crankshaft into place.



before. We cleaned and serviced each piece once they arrived at the re-erection site before placing them onto the foundation. The last big part to retrieve, as it was the first stored, was the compressor cylinder. The crew got the 10-ton compressor loaded onto the old "tilt-bed" truck for the short trip back to Coolspring. This was September 2007 and it had yet to be cleaned and prepared for the coming winter.

Together again

The next year, 2008, saw the engine taking form and coming together. So much work had already happened without seeing a final product, that this would be

a pleasant job. It was now going to look like that massive 600 HP Snow again! In June 2008, the cylinder base plate and rear crosshead casting were placed, and the rear power cylinder was lowered into place by the Lorain crane. Each part, starting from the main frame, must be carefully aligned and bolted to the previous one before the next can be placed. This includes the rear crosshead casting, the rear cylinder, the center crosshead casting, the front cylinder, and the tail rod casting; and each weighs 8 to 10 tons ... a long and tedious job.

In July, 2008, the Lorain lowered the crankshaft into place. The bottom half of

the flywheel had already been placed and blocked into position. The crankshaft really did not look that big but weighed 8 tons. Finally, in September, the top half of the flywheel was lowered into place, which concluded a great year of progress! It was an evening to relax and admire the engine.

The next year, 2009, witnessed continuing progress of assembling the engine's main components, which required overhead room for the Lorain crane to operate. When completed, a building was started. Massive I-beam posts and trusses



Above: The top half of the flywheel lowered into place. Right: The new structure completed and prepared for the coming winter.





Installing the igniters.

had been donated and prepared, then finally erected. By October, the present structure was completed and prepared for the coming winter. It had been a good year and we were well satisfied.

Devil's in the details

By spring of 2010, the crew had accomplished all the "big" projects and the engine really looked like itself again, although now much detail had to be addressed. All the pipe work for the natural gas supply, the air intake, the exhaust, the lubrication system, the cooling water supply and discharge, and the starting air needed to be done. This required countless hours of cutting, threading and placing pipe from 1/8-inch to 10-inch diameter. Ancillary to the engine, a water cooling system with buried sump tanks and tower-mounted tank was installed. A huge air tank for compressed starting air was installed and tested. In all, more than 1,000 feet of pipe was used. Next came a new electric service entrance to supply all the lights and pumps. It was a big year of tedious work.

The final touches began in 2011, including the installation

of the igniters. The coil box was mounted and 800 feet of ignition wire was placed into conduit to make the system operate. The next two years were busy with progress on all the engine support systems. This even included final grading and gravel placement to make the area more presentable.

The big day

Finally the big day came during our June 2013 Summer Show. After so much diligent work, the crew decided to try to start the engine. This was the Tuesday evening of show week and a formal run was not planned until the October show. However, with all ready and relative privacy, the crew started the air compressor, filled the starting tank and turned on the lube

oil. Chris manned the controls and the crew watched. It slowly rolled on starting air and then fired on the third revolution of the big wheel! The rest of the crew watched all the parts as the Snow finally came to life again! It steadied into a smooth rhythm and ran well for the next 15 minutes. Then it was time to shut down and check all the parts. Very satisfied with the great start and operation, it ran for all to see several others times during the show. Twenty years since it was dismantled at Roystone, the Snow "lives" at Coolspring.

The formal dedication ceremony was done on Oct. 18, 2013. It enjoyed a weekend with hundreds of spectators crowding around to see it run. A dream has come true!

*Gas Engine Magazine would like to thank Coolspring Power Museum founder Paul Harvey for allowing us to reprint this article, which originally appeared in **The Flywheel**, Coolspring's monthly newsletter.*

Want more on Coolspring's 600 HP Snow? Get a detailed history of manufacturer Snow Steam Pump Works, see video of Coolspring's Snow in motion and more at www.gasenginemagazine.com/Coolspring-Snow

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Chris manning the controls while the crew watches the Snow being fired up for the first time.

Restored circa 1925 1-1/4 HP Monitor VJ sitting pretty

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